Space Weather Forecast

Issued on Thursday, 14 December 2023 at 00:39 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Isolated Moderate flares likely. Chance of Active-G1 Minor Storm intervals day 3 (16 Dec) from coronal mass ejection arrival.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Low with a number of Common class flares, the strongest from a spot which has transited around the west limb. AR3514 remains the largest region and is magnetically complex. Nearby growth from a separate newly developing region may also destabilise this region further. A further active region recently emerged in the southeast, but remains relatively small and simple. There are eight sunspot regions in total, however all other regions remain small, simple and either stable or declining.
A faint, but broad coronal mass ejection (CME) was observed leaving the Sun to the northwest around 13/0100 UTC. This has been attributed to a long lasting common class flare of the developing spot. Analysis indicates a relatively slow Earth-directed CME is expected, currently anticipated to arrive on day 4 (16 Dec).
Solar Wind / Geomagnetic Activity: Solar winds were at background, below 400 km/s. Total Interplanetary Magnetic Field was predominantly weak, but became moderate from 13/2200 UTC, probably due to a transient feature passing through L1. The north-south component also became moderate from 13/2200UTC with a significant negative component. Despite this geomagnetic activity remained Quiet to Unsettled (Kp1-3).
Energetic Particles / Solar Radiation: The count rate of energetic particles remained at background levels with no solar radiation storms observed.

Four-Day Space Weather Forecast Summary
Solar Activity: Low to Moderate activity is expected with Moderate class flares likely, primarily from the developing sunspot region.
Solar Wind / Geomagnetic Activity: The CME that occurred on 13 Dec is currently expected to arrive on day 3 (16 Dec) however confidence is low. Otherwise current background winds are likely to enhanced from the arrival of the fast winds from a small coronal hole on day 1 and into day 2 (14-15 Dec), before easing thereafter. Winds are likely to peak elevated, at around 500-550 km/s, however confidence is currently low in both timing and peak wind strength. Mainly Quiet geomagnetic activity at first is forecast to become Unsettled to Active day 1 and into day 2 (14-15 Dec), with a slight chance of an isolated G1 Minor Storm interval, before easing later day 2 to Quiet with isolated Unsettled intervals. There is a chance of a spell of Active to G1 Minor storms on day 3 (16 Dec) from any CME arrival.
Energetic Particles / Solar Radiation: The count rate of energetic particles is forecast to remain at background levels with only a very slight chance of rising towards the S1/Minor Radiation Storm threshold should any significant flares occur.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	15	10	25	15
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	60	60	60	60
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	5	5	5
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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